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**REMARKS**

Claims 65-67, 74, 77-81, 83-85, 87, 89, and 91-96 are pending in the application with claims 65, 74, and 78 amended herein and claims 86, 88, and 90 canceled herein without prejudice.

Claim 74 stands rejected under 35 U.S.C. §102(e) as being anticipated by Nakamura. Applicant traverses and requests reconsideration.

In pertinent part, amended claim 74 sets forth a capacitor that includes, among other features, roughened platinum having a continuous surface characterized by columnar pedestals having an average diameter of at least about 200 Angstroms. Pages 2-3 of the Office Action allege that Nakamura discloses every element of claim 74, however, page 7 of the Office Action admits that Nakamura does not teach the average diameter of the columnar pedestals. Anticipation requires disclosure of each and every element. Accordingly, Nakamura does not anticipate claim 74. Applicants request allowance of claim 74 in the next Office Action.

Claim 74 stands rejected under 35 U.S.C. §102(e) as being anticipated by Aoki. Applicant traverses and requests reconsideration.

The subject matter of amended claim 74 is described above in pertinent part. Page 3 of the Office Action alleges that Aoki discloses every element of claim 74. However, page 5 of the Office Action admits that Aoki does not teach the average diameter of the columnar pedestals. Anticipation requires disclosure of each and every element. Accordingly, Aoki does not anticipate claim 74. Applicants request allowance of claim 74 in the next Office Action.

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Claims 65-67, 77, 85-89, and 92-96 stand rejected under 35 U.S.C. §103(a) as being unpatentable over Aoki in view of Kingon. Applicant traverses and requests reconsideration.

In pertinent part, amended claim 65 sets forth an integrated circuit that includes, among other features, a roughened platinum layer having a continuous surface characterized by columnar pedestals that have an average diameter of at least about 200 Angstroms. Pages 4-5 of the Office Action allege that Aoki in view of Kingon discloses every element of claim 65. However, page 5 of the Office Action acknowledges that neither Aoki nor Kingon teach the average diameter of the columnar pedestals. Rather, page 5 alleges that the average diameter of columnar pedestals constitute the optimum value of a results effective variable, the discovery of which involves only routine skill in the art. A finding of obviousness requires the prior art to suggest making the claimed device and also requires the prior art to reveal a reasonable expectation of success. Both of Aoki and Kingon fail to meet the two just stated requirements.

As is readily apparent throughout the present specification, a roughened platinum layer may be advantageously used in the claimed integrated circuit. Specific methods are described in the present specification to enhance and control the platinum layer roughness. By contrast, column 8, lines 57-60 and column 5, lines 39-43 state that the goal of Aoki is to "flatten" platinum layer 38 using electropolishing to eliminate certain problems. That is, Aoki expressly teaches against enhancing or even maintaining the roughness of a platinum layer. The purpose of Aoki is to reduce the roughness.

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The Office Action states that the claimed average diameter of at least about 200 Angstroms is an optimum value the discovery of which involves only routine skill. However, Aoki expressly teaches against a roughened platinum layer, as claimed. Accordingly, the clear motivation to those of ordinary skill in the art viewing Aoki is to "flatten" the roughness of a platinum layer, rather than to optimize the roughness such that columnar pedestals have an average diameter of at least about 200 Angstroms. Accordingly, the cited art fails to motivate those of ordinary skill to make the claimed device.

In addition, a reasonable expectation of success is required. The average diameter of at least about 200 Angstroms set forth in claim 65 is achieved using the methods set forth in the present specification at least from page 8, line 12 to page 9, line 9 and page 11, line 19 to page 13, line 10. Neither Aoki nor Kingon disclose or are alleged to disclose methods by which those of ordinary skill would have a reasonable expectation of success. Aoki is deficient in enabling production of the claimed roughened platinum layer with columnar pedestals having an average diameter of at least about 200 Angstroms. Since the cited art does not provide any teaching that would allow those of ordinary skill to optimize some known method into producing the claimed structure, it is not seen how Aoki and/or Kingon can be considered to place the claimed invention within the grasp of those of ordinary skill.

Applicants assert that the cited art does not suggest making the claimed device. Applicants further assert that the cited art does not reveal that those of ordinary skill would have a reasonable expectation of success. At least for such reasons, Aoki in view of Kingon fails to disclose or suggest the subject matter

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admitted on page 5 as missing from such references. Accordingly, claim 65 is patentable over the cited references. Claims 66, 67, 77, 85, and 87 depend from claim 65 and are patentable at least for such reason as well as for the additional limitations of such claims not disclosed or suggested.

Claims 89 depends from claim 74. Claim 74 is not rejected as being unpatentable over Aoki in view of Kingon. By virtue of its dependence from claim 74, claim 89 is thus patentable over the cited references.

Claim 92 sets forth a capacitor including, among other features, at least one of a first and a second capacitor electrode containing roughened platinum formed by a process described in claim 92. Claim 92 thus encompasses the structure of a roughened platinum that results from the method portion of claim 92. As described throughout the present specification, such a method advantageously enhances the roughness of the platinum comprised by the capacitor of claim 92. In contrast, the methods of Aoki "flatten" the roughness of an electrode, as discussed above with regard to claim 65.

Applicants thus assert that the structural features produced in roughened platinum by the process incorporated in claim 92 are not disclosed or suggested by the cited art. Applicants acknowledge that the method recitations as such are non-limiting. However, the final product resulting from such method recitations is limiting and the cited references do not disclose or suggest such final product.

Rather, the cited references teach against such roughened platinum. The cited references also do not reveal to those of ordinary skill a reasonable expectation of success in achieving the structure embodied in the claimed final product. At least for such reasons, claim 92 is patentable over Aoki in view of Kingon.

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Claims 93-96 depend from claim 92 and are further patentable over the cited art at least for such reason as well as for the additional structural limitations that are not disclosed or suggested in the cited art and result from the method recitations described in claims 93-96.

Applicants request allowance of claims 65-67, 77, 85, 87, 89, and 92-96 in the next Office Action.

Claims 92-96 stand rejected under 35 U.S.C. §103(a) as being unpatentable over Buskirk. Applicant traverses and requests reconsideration.

The subject matter of claim 92 is described above in pertinent part. Pages 6-7 of the Office Action allege that Buskirk discloses the capacitor set forth in claim 92 and fails to afford any patentable weight to the unique structural features produced in the final product resulting from the product-by-process limitations set forth in claim 92. As can be readily appreciated at least from page 11, line 19 to page 1, line 10 the method recitations of claim 92 yield roughened platinum that is not disclosed or suggested by Buskirk. A finding of obviousness requires disclosure of every claim limitation.

Since Buskirk fails to disclose or suggest the structural features resulting from the product-by-process limitations, claim 92 is patentable over Buskirk. Claims 93-96 depend from claim 92 and are further patentable at least for such reason as well as for the additional structural limitations produced in the device of claim 92 by virtue of the additional method recitations in the dependent claims. Applicants request allowance of claims 92-96 in the next Office Action.

Claims 65-67, 77-81, and 83-96 stand rejected as being unpatentable over Nakamura. Applicant traverses and requests reconsideration.

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The subject matter of claims 65 and 78 is discussed above. Pages 7-8 of the Office Action acknowledge that Nakamura does not teach the average diameter of the columnar pedestals, but allege that such diameter is an optimum value, the discovery of which involves only routine skill in the art. Applicants assert that Nakamura does not suggest making the claimed device and that Nakamura does not reveal a reasonable expectation of success.

Nowhere within Nakamura is any mention whatever given of the roughness of a platinum layer. Claims 65 and 78 quantify the roughness of the claimed platinum layer by setting forth an average diameter of at least about 200 Angstroms for the columnar pedestals. Applicants note with reference to Fig. 5 of the present specification and the associated text, that the average diameter of grains in a conventional platinum layer are much less than 200 Angstroms. Note the 100 nm scale printed in Fig. 5 compared to the grain sizes on the surface of the platinum layer. Given the absence of any disclosure otherwise, one of ordinary skill would assume the platinum layer of Nakamura to exhibit similar grain sizes to those shown in Fig. 5. The Office has not made any allegation for support of a conclusion otherwise.

In addition, Nakamura does not contain and is not alleged to contain any suggestion to those of ordinary skill to make the claimed device including roughened platinum with columnar pedestals having an average diameter of at least about 200 Angstroms. Even though the Office Action alleges that Fig. 2 and others of Nakamura inherently show roughened platinum, such figures do not show platinum roughened to the extent set forth in claims 65 and 78. The only discussion within Nakamura of roughness is with regard to the surface of

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polysilicon plug 110, such as discussed in column 2, lines 28-33. It must be concluded that if Nakamura in any way contemplated "roughened" platinum, such as claimed, then mention would be provided of such material given the concern over roughened polysilicon plug 110.

In addition, Nakamura does not provide any discussion of methods suitable to produce roughened platinum such as set forth in claims 65 and 78. Given the complete absence of instructions to those of ordinary skill as to how to obtain the claimed material, those of ordinary skill lack a reasonable expectation of success.

At least for the reasons described above, claims 65 and 78 are patentable over Nakamura. Claims 66, 67, 77, 85, and 87 depend from claim 65 and claims 79-81, 83, 84, and 89 depend from claim 78. Such dependent claims are also patentable at least for their dependency as well as for the additional limitations of such claims not disclosed or suggested.

The subject matter of claim 92 is described above. Applicants assert that Nakamura is deficient in the same respect as discussed above with regard to Aoki. At least for such reason, claim 92 is patentable over Nakamura. Claims 93-96 depend from claim 92 and are further patentable at least for such reason.

Applicants request allowance of claims 65-67, 77-81, 83-85, 87, 89, and 91-96 in the next Office Action.

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Applicant herein establishes adequate reasons for allowability of pending claims 65-67, 74, 77-81, 83-85, 87, 89, and 91-96. Applicant requests allowance of all pending claims in the next Office Action.

Respectfully submitted,

Dated: \_\_\_\_\_

26 Nov 2002

By: \_\_\_\_\_

  
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Inventor..... E. Marsh  
Assignee .....Micron Technology, Inc.  
Group Art Unit ..... 2811  
Examiner ..... H. Vu  
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Title: Circuitry and Capacitors Comprising Roughened Platinum Layers

**VERSION WITH MARKINGS TO SHOW CHANGES MADE ACCOMPANYING  
RESPONSE TO AUGUST 26, 2002 OFFICE ACTION**

The claims have been amended as follows. Underlines indicate insertions  
and ~~strikeouts~~ indicate deletions.

65. (three times amended) An integrated circuit comprising:

a monocrystalline silicon substrate;

a roughened platinum layer over the substrate, the roughened platinum  
layer having a continuous surface characterized by columnar pedestals that  
are at least about 300Å tall and have an average diameter of at least about  
200 Å; and

an intervening layer between the platinum layer and the substrate, the  
intervening layer comprising at least one of IrO<sub>2</sub>, RuO<sub>2</sub>, RhO<sub>2</sub>, or OsO<sub>2</sub>.

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74. (twice amended) A capacitor comprising:

a first capacitor electrode over a monocrystalline silicon substrate;

a second capacitor electrode;

a dielectric layer between the first and second capacitor electrodes;

wherein at least one of the first and second capacitor electrodes

comprise roughened platinum, the roughened platinum having a continuous surface characterized by columnar pedestals having heights greater than or equal to about one-third of a total thickness of the roughened platinum and having an average diameter of at least about 200 Å.

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78. (twic amended) An integrated circuit comprising:

a semiconductive substrate;

a conductive node location disposed within the semiconductive substrate;

a first layer disposed over the semiconductive substrate and in electrical contact with the conductive node, the first layer comprising at least one of iridium, rhodium, ruthenium, palladium, osmium, silver, alloy,  $\text{IrO}_2$ ,  $\text{RuO}_2$ ,  $\text{RhO}_2$ , or  $\text{OsO}_2$ ; and

a platinum alloy layer disposed over the first layer, the platinum alloy layer characterized by a continuous, roughened outer surface, the platinum alloy layer comprising platinum and at least one of rhodium, iridium, ruthenium, palladium, osmium or silver, and the roughened platinum alloy layer comprising columnar pedestal structures having heights greater than or equal to about one-third of a total thickness of the roughened platinum alloy layer and having an average diameter of at least about 200 Å.

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